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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,916	01/25/2006	Tammy Cheng	DC5157 PCT1	9371
137 7590 01/28/2010 DOW CORNING CORPORATION CO1232 2200 W. SALZBURG ROAD P.O. BOX 994 MIDLAND, MI 48686-0994				
EXAMINER				
SMOOT, STEPHEN W				
ART UNIT		PAPER NUMBER		
2813				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents.admin@dowcorning.com

Office Action Summary

Application No.

10/565,916

Applicant(s)

CHENG ET AL.

Examiner

Stephen W. Smoot

Art Unit

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 October 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 2, 4, 7-12, 15 and 16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4, 7-12, 15 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This Office action is in response to applicant's amendment filed on 07 October 2009.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 7-12, 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano et al. (US 2002/0153618 A1) in view of Bottini (US 3,808,673).

Referring to Figs. 1-10 and paragraphs [0051] to [0071], Hirano et al. disclose a semiconductor device that includes a semiconductor chip (7A) mounted onto a surface of a substrate (1) using an adhesive (9), bond wires (10) to electrically connect the chip (7A) to the substrate (1), a silicone-containing overmold resin (11) to seal the chip (7A) (see paragraph [0065]), and solder balls (12) on an opposite surface of the substrate

(1). Referring to Figs. 11-13 and paragraphs [0072] to [0079], Hirano et al. further disclose that the semiconductor device can be formed by using adhesive (9) to mount the chip (7A) to a plastic film (20), connecting bond wires (10) between the chip (7A) and the plastic film (20), placing this assembly in a mold (30) to apply the silicone-containing overmold resin (11) by injection molding, applying solder balls (12) to the opposite surface, and cutting the plastic film into a substrate (1). These are limitations as set forth in claims 7-8, 15-16 of the applicant's invention.

However, Hirano et al. lack specific details regarding their injection molding process including the clamping force between 1 to 80 tons (a limitation of claims 7, 15-16) or, more specifically, between 1 to 27 tons (the limitation of claim 9), an injection pressure between 0.3 to 7 MPa (a limitation of claims 7, 15-16), heating the mold cavity (a limitation of claims 7, 15-16), and curing the die attach adhesive (a limitation of claim 15). Further, Hirano et al. lack a silicone viscosity of 80 to 3000 Poise and a cured product of the silicone composition having a modulus of 100 to 1000 MPa, which are limitations of independent claims 7, 15-16.

Bottini teaches that a semiconductor device can be packaged by injection molding and that the mold material can be silicone resin that can be cured for 120 to 150 seconds using a mold temperature of 190 degrees C, using a pressure of 600 psig (i.e about 4 MPa), and using a clamping force of 15 tons (see column 4, lines 25-43).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Hirano et al. and Bottini in order to use the molding parameters, as taught by Bottini, for sealing the package of

Hirano et al. by injection molding, because Bottini shows that these are known parameters for molding silicone resin. Regarding the silicone viscosity and the modulus of the cured silicone composition, these are property limitations that are presumed to be inherent to the combination of Hirano et al. and Bottini, per MPEP section 2112.01, because the process for producing the silicone-containing resin of this combination is substantially identical to applicant's claims 7, 15-16. Accordingly, per MPEP section 2112, part V, the burden is shifted to the applicant to show an unobvious difference between their as-claimed invention and the combination of Hirano et al. and Bottini.

Regarding claim 10, Hirano et al. do not expressly teach or suggest that the cured silicone-containing resin is optically clear. Bottini teaches that a clear silicone resin can be used to optically couple a light emitting diode to a detector (see column 3, line 66 to column 4, line 24). Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the teachings of Hirano et al. by using an optically clear silicone resin, as taught by Bottini, in order to transmit light into or out of the sealed package disclosed by Hirano et al.

Regarding claims 11-12, the combination of Hirano et al. and Bottini lacks the specific mold temperature range as set forth in claim 11 or the injection pressure range as set forth in claim 12. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combination of Hirano et al. and Bottini in order to use a mold temperature within the range of claim 11 and/or an injection pressure within the range of claim 12 through routine experimentation to

discover the workable ranges of the combination [see *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955)].

3. Claims 1, 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano et al. (US 2002/0153618 A1) in view of Bottini (US 3,808,673) and Chaudhury et al. (US 2003/0145940 A1).

Referring to Figs. 1-10 and paragraphs [0051] to [0071], Hirano et al. disclose a semiconductor device that includes a semiconductor chip (7A) mounted onto a surface of a substrate (1) using an adhesive (9), bond wires (10) to electrically connect the chip (7A) to the substrate (1), a silicone-containing overmold resin (11) to seal the chip (7A) (see paragraph [0065]), and solder balls (12) on an opposite surface of the substrate (1). Referring to Figs. 11-13 and paragraphs [0072] to [0079], Hirano et al. further disclose that the semiconductor device can be formed by using adhesive (9) to mount the chip (7A) to a plastic film (20), connecting bond wires between the chip (7A) and the plastic film (20), placing this assembly in a mold (30) to apply the silicone-containing overmold resin (11) directly to the chip (7A), the bond wires(10), and to the plastic film (20) by injection molding, applying solder balls (12) to the opposite surface of the plastic film (20), and cutting the plastic film (20) into a substrate (1). These are limitations as set forth in claims 1, 4 of the applicant's invention.

However, Hirano et al. lack specific details regarding their injection molding process that includes heating the mold cavity (a limitation of claim 1), curing the die attach adhesive (a limitation of claim 1), using a silicone viscosity of 80 to 3000 Poise (a

limitation of claim 4), a cured over mold of the silicone composition having a modulus of 25 to 1000 MPa (a limitation of claim 4), and curing for 30 to 120 seconds at 80 to 240 degrees C (limitations of claim 4). Further, Hirano et al. lack the limitations of plasma treating a surface of the die attach adhesive, plasma treating a surface of the semiconductor die, and contacting these plasma treated surfaces with each other, which are also limitations as set forth in claim 1 of the applicant's invention.

Bottini teaches that a semiconductor device can be packaged by injection molding a silicone resin by curing for 120 to 150 seconds at a mold temperature of 190 degrees C (see column 4, lines 25-43). Chaudhury et al. teach that surfaces of an adhesive and a semiconductor can be plasma treated in order to improve adhesion between the surfaces (see paragraphs [0017] to [0034]).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Hirano et al. and Bottini in order to use the injection molding parameters, as taught by Bottini, for sealing the package of Hirano et al., because Bottini shows that these are known parameters for injection molding silicone resin. It also would have been obvious to further combine the teachings of Hirano et al. and Bottini with those of Chaudhury et al. in order to plasma treat the adhesive surface and chip surface for improved adherence.

Regarding the silicone viscosity and the modulus of the cured silicone composition ranges of claim 4, these are property limitations that are presumed to be inherent to the combination of Hirano et al. Bottini, and Chaudhury et al., per MPEP section 2112.01, because the process for producing the silicone-containing resin of this

combination is substantially identical to applicant's claims 1, 4. Accordingly, per MPEP section 2112, part V, the burden is shifted to the applicant to show an unobvious difference between their as-claimed invention and the combination of Hirano et al., Bottini, and Chaudhury et al.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hirano et al. (US 2002/0153618 A1), Bottini (US 3,808,673), and Chaudhury et al. (US 2003/0145940 A1) as applied to claim 1 above, and further in view of Takeuchi et al. (US 6,475,629 B1).

As shown above, the combination of Hirano et al., Bottini, and Chaudhury et al. has all of the limitations as set forth in claim 1 of the applicant's invention. However, this combination does not expressly teach or suggest that the die attach adhesive includes silicone, which is the further limitation to claim 1 as set forth in claim 2 of the applicant's invention. Takeuchi et al. teach that a die attach adhesive (4) can include a siloxane-based resin (see Fig. 5 and column 14, line 54 to column 15, line 6).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to combine the teachings of Hirano et al., Bottini, Chaudhury et al., and Takeuchi et al. in order to include silicone material in the die attach adhesive like the siloxane resin of Takeuchi et al., because Takeuchi et al. recognize that the siloxane resin exhibits strong adhesion (see column 25, lines 46-54).

Response to Arguments

5. Applicant's arguments filed 07 October 2009 have been fully considered but they are not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The applicant argues that it would not be obvious to modify Bottini with the teachings of Hirano et al. However, the prior art rejections, as presented above, are based on modifying the injection molded packaging method of Hirano et al. by using the molding parameters that are taught by Bottini. Accordingly, the prior art rejections are not specific to Bottini's method of packaging an emitter-detector pair, which is the basis of the applicant's arguments.

Regarding the applicant's argument that there would be no reasonable expectation for success in combining the teachings of Hirano et al. and Bottini, the applicant's conclusion is base on modifying Bottini with the teachings of Hirano et al. while, as indicated in the above paragraph, the prior art rejections are actually based on modifying the injection molded packaging method of Hirano et al. by using the molding parameters that are taught by Bottini. Therefore, the examiner disagrees with the applicant's conclusion that the expectation for success would be unreasonable for

combining Hirano et al. with Bottini. It is further noted that the applicant's have not provided any evidence to show that there would be no reasonable expectation for success in combining Harano et al. with Bottini.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the feature upon which applicant relies (i.e., minimizing wire sweep) is not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Conclusion

6. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen W. Smoot whose telephone number is 571-272-1698. The examiner can normally be reached on Monday to Friday from 8:00am to 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Landau can be reached on 571-272-1731. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen W Smoot/
Primary Examiner
Art Unit 2813

SWS